GOVERNMENT OF NEWFOUNDLAND AND LABRADOR

Highway Planning and Research
Department of Transportation
St. John's, Newfoundland

BENEFIT/COST ANALYSIS:

ROUTE 420 AND ROUTE 421
TRANS CANADA HIGHWAY TOWARDS
HAMPDEN AND JACKSONS ARM

RESEARCH REPORT NO. 33

Department of Transportation

Highway Planning
and Research
November 1985

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1.0 INTRODUCTION

This benefit/cost analysis of Route 420 and Route 421 is based on the traditional components of transportation economics. Accordingly the benefits portion includes changes in vehicle operating costs, time savings, accident reductions, and consumer surplus. The cost section includes capital cost of construction, the additional ongoing maintenance costs required by the new link, and the future salvage value at the end of the life of the facility.

The chapter on cost effectiveness provides additional comments to assist the decision making process.

2.0 CONSTRUCTION COST

The additional 9 km of reconstruction near Turners Ridge required to bring Route 420 to an RLU80 standard is estimated to cost $2 million. To pave Route 420 and Route 421, the latter to an RLU70 standard, is estimated to cost $14 million.

Reasonably a cash flow of $3 million per year could be allocated to this project. On this basis the net present worth of the construction, using the Treasury Board approved discount rate of 10%, would be $11,936,833 in 1985 dollars assuming commencement of the project in 1986.

3.0 MAINTENANCE

The average cost per kilometre for road maintenance in District Four in fiscal year 1983/84 was $4818 for gravel roads and $4023 for paved roads. The annual maintenance saving associated with reconstruction and paving the 85 km of Route 420 and 421 would be $67,575.

The facility is assumed to have a service life of 15 years without additional major capital improvement. The maintenance savings over this period of time would have a net present worth of $513,981.

4.0 SALVAGE VALUE

At the end of the facility life a residual value will remain from the investment in right of way, mass earth movement, some structures, and potentially some areas of sub grade. Most of this residual value will exist regardless of whether or not the roadway is paved, however, the paved surface will better protect the subgrade from traffic and environmental degradation. On this basis 10% of the capital cost of the pavement is allowed for salvage after 15 years service.

The net present worth of the salvage value is $335,149.

5.0 COST SUMMARY

To summarize the cost aspects of paving Route 420 and Route 421, the maintenance cost savings and the salvage value must be subtracted from the construction cost. On this basis the net present cost of the project would be $11,087,703.

6.0 TRAFFIC VOLUMES

Table 6.1 summarizes the 1984 traffic volumes associated with various sections of Route 420 and Route 421.

TABLE 6.1

1984 ANNUAL AVERAGE DAILY TRAFFIC
ROUTE 420 AND ROUTE 421

SECTION	Cars	Single Unit Trucks	Transport Trucks	Total
Route 420				
TCH to Jct 421	276	42	29	347
Jct 421 to Gales Brook	199	21	16	236
Gales Brook to Pollard's Point Rd.	244	16	29	289
Pollards's Point Rd. to Sop's Arm	380	21	18	419
Sop's Arm to Cat Arm Access	104	13	16	133
Cat Arm Access to Jackson's Arm	201	26	13	240
Route 421				
Jct 420 to Hampden	151	26	13	190
Hampden to Beaches	218	2	10	230

Vehicle occupancies are assumed to be similar to those observed in a 1979 study of traffic on Route 410 north of the Trans Canada Highway. Transport units had one driver, pickups and single unit trucks averaged 2 persons, while automobiles had 2.6 persons as occupants.

The 1984 AADT was growthed to 1985 by an expansion of 10% to represent present conditions. Future traffic growth to year 2000, based on the Role of Mode study recently jointly completed by Transport Canada and Newfoundland Transportation, would be at an annual growth rate of 3.5%. To this traffic volumes was added the 60 daily one way truck trips identified by Corner Brook Pulp and Paper as being generated by their Main River logging operation and 10 additional daily one way truck trips identified by the White Bay South Development Association as being generated by an expanded private pulp cutting operation.

Half of the new logging operation truck trips are assumed to access timber at Gales Brook and the other half at Cat Arm Access. Addition of the traffic patterns and the growth rates provides the data for future traffic volumes found in Table 6.2.

TABLE 6.2

SYSTEM TRAFFIC VOLUMES

SECTION	New Truck AADT	1985 AADT	2000 AADT	Distance (km)
Route 420				
TCH to Jct 421	70	452	710	8.5
Jct 421 to Gales Brook	70	330	506	17.2
Gales Brook to Pollard's Point Rd.	35	353	568	26.1
Pollard's Point Rd. to Sop's Arm	35	495	805	1.8
Sop's Arm to Cat Arm Access	35	181	280	11.9
Cat Arm Access to Jackson's Arm	0	264	442	3.0
Route 421				
Jct 420 to Hampden	0	209	350	11.6
Hampden to Beaches	0	253	424	5.3

7.0 VEHICLE OPERATING COSTS

The type of road surface affects the various components of vehicle operating cost such as fuel consumption, oil consumption, tire wear, and roadway related vehicle depreciation. The Priority Planning System maintained by the Ontario Ministry of Transportation and Communications provides computer analysis of these data in order to determine the benefits to the travelling public.

The net present value of the change in vehicle operating costs associated with paving Route 420 and Route 421 is negative as vehicles could travel at faster speeds. The improved road surface would actually cost the travelling public some $60,000 over the 15 year life of the roadway.

8.0 TIME SAVINGS

Assuming a time value per person in an automobile to be worth $3.69 per hour, the time value for a single unit truck to be $12.00 per hour reflecting both the driver and the helper, and the time value for a transport truck to be $9.00 per hour the Priority Planning System assists in calculating the value of time saved.

Increasing the speed limit to 80 km per hour to reflect the benefits of pavement results in a net present value of $6.2 million for time savings on Route 420 and Route 421.

9.0 ACCIDENT COSTS

Table 9.1 summarizes the accident history of Route 420 and Route 421 for 1982 and 1983.

TABLE 9.1

ACCIDENT HISTORY

	Number Total	Persons Injured	Persons Killed
1982			
Route 420	32	9	0
Route 421	17	3	0
1983			
Route 420	17	3	0
Route 421	5	2	0

Considering traffic volumes and distance driven in 1982, Route 420 has an accident rate of 5.0 accidents per million vehicle kilometres while Route 421 has a rate of 13.6. The respective figures for 1983 are 2.6 and 4.0 accidents per million vehicle kilometres. The rate for Route 421 is inflated by the urban nature of the road through Hampden while communities of Sops Arm and Jackson's Arm influence the rate for Route 420. Little change in accident rates is expected following paving of the roadway.

10.0 CONSUMER SURPLUS

The present gravel roadway can be a deterrent to travel on Routes 420 and 421. The latent demand, assumed to be released by paving the roadways, is estimated based on the

improved travel time for the road. In this case increasing the speed limit from 60 km per hour to 80 km per hour effectively reduces travel time by 25%. Thus following completion of the pavement road traffic can be expected to grow by up to 25% as latent demand for faster transportation is released.

The value of the trip to the latent traffic is shown by transportation economy literature to be one half of the operating costs of the vehicles on the system prior to construction.

On this basis the value of the latent trips would be $534,520 based on demand for the faster, paved roadway.

11.0 BENEFIT SUMMARY

Paving of Route 420 and Route 421 would add $60,000 to vehicle operating costs, reduce by $6,245,000 the time costs of using the system, and generate new trips valued at $534,520.

12.0 BENEFIT/COST SUMMARY

Dividing the identified and quantified benefits by the estimated cost produces a benefit/cost ratio of 0.61 indicating a shortfall in quantifiable benefits of some $4.4 million.

13.0 COST EFFECTIVENESS

The transportation economy analysis cannot account for the benefits associated with the provision of a new roadway suitable to haul wood and fish during winter months when presently ice conditions preclude the movement of heavy vehicles, nor during spring months when the present roadway is subjected to reduced loadings due to soft conditions.

Both wood and fish are major contributors to the local economy.

Within the constraints of a provincial budget no new jobs would be created by construction or maintenance of the road. Such a situation would only be valid if new Federal funding were earmarked for the road.

14.0 CONCLUSION

From a transportation economy standpoint the paving of Route 420 and Route 421 is not recommended. Should the economic health of the wood and fish sectors, and of those persons dependent upon them, be valued in excess of $4.4 million then the project is recommended.

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